

*****RMIS Viewprint Document Cover Sheet*****

This document was retrieved from the Records Management Information System (RMIS). It is intended for information only and may not be the most recent or updated version.

Accession #:D4284191

Document #: WMP-20113

Title/Desc:

**DATA QUALITY OBJECTIVES SUMMARY REPORT FOR WASTE
DISPOSITION OF FY2004 ISRM INJECTION & MONITORING
WELLS**

Pages: 45

Date Received for Clearance Process (MM/YY/DD)		INFORMATION CLEARANCE FORM					
3/3/04							
A. Information Category		B. Document Number WMP-20113, Rev. D					
<input type="checkbox"/> Abstract <input type="checkbox"/> Journal Article <input type="checkbox"/> Summary <input type="checkbox"/> Internet <input type="checkbox"/> Visual Aid <input type="checkbox"/> Software <input type="checkbox"/> Full Paper <input checked="" type="checkbox"/> Report <input type="checkbox"/> Other		C. Title Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 ISRM Injection and Monitoring Wells					
		D. Internet Address					
E. Required Information		3. Does Information Contain the Following: (MANDATORY)					
1. Is document potentially Classified? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (MANDATORY)		a. New or Novel (Patentable) Subject Matter? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes					
See below for signature Manager's Signature Required		If "Yes", Disclosure No.:					
If Yes <input type="checkbox"/> No <input type="checkbox"/> Yes Classified		b. Information Received in Confidence, Such as Proprietary and/or Invention <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", Affix Appropriate Legends/Notices.					
ADC Signature Required		c. Copyrights? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", Attach Permission.					
2. References in the Information are Applied Technology <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		d. Trademarks? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", Identify in Document.					
Export Controlled Information <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		4. Is Information requiring submission to OSTI? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes					
		5. Release Level? <input checked="" type="checkbox"/> Public <input type="checkbox"/> Limited					
F. Complete for a Journal Article							
1. Title of Journal							
G. Complete for a Presentation							
1. Title for Conference or Meeting							
2. Group Sponsoring							
3. Date of Conference							
4. City/State							
5. Will Information be Published in Proceedings? <input type="checkbox"/> No <input type="checkbox"/> Yes							
6. Will Material be Handed Out? <input type="checkbox"/> No <input type="checkbox"/> Yes							
H. Author/Requestor		Responsible Manager					
Greg Thomas (Print and Sign)		Craig Swanson (Print and Sign)					
I. Reviewers		Signature					
Yes Print		Public Y/N (If N, complete					
General Counsel <input checked="" type="checkbox"/>		Stephen B. Cherry		Stephen B. Cherry		N	
Office of External Affairs <input type="checkbox"/>						Y / N	
DOE-RL <input checked="" type="checkbox"/>		J. G. Morse		John G. Morse		Y / N	
Other <input type="checkbox"/>						Y / N	
Other <input type="checkbox"/>						Y / N	
J. If Information Includes Sensitive Information and is not to be released to the Public indicate category below.				Information Clearance Approva			
<input type="checkbox"/> Applied Technology <input type="checkbox"/> Protected CRADA							
<input type="checkbox"/> Personal/Private <input type="checkbox"/> Export Controlled							
<input type="checkbox"/> Proprietary <input type="checkbox"/> Procurement-Sensitive							
<input type="checkbox"/> Business-Sensitive <input type="checkbox"/> Patentable							
<input type="checkbox"/> Predecisional <input type="checkbox"/> Other (Specify)							
<input type="checkbox"/> UCNI							
K. If Additional Comments, Please Attach Separate Sheet							

Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 ISRM Injection and Monitoring Wells

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Fluor Hanford

P.O. Box 1000
Richland, Washington

Contractor for the U.S. Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 ISRM Injection and Monitoring Wells

March 2004

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Fluor Hanford

P.O. Box 1000
Richland, Washington

Contractor for the U.S. Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

Chris Killenham
Clearance Approval

3/11/04
Date

N/A
Release Approval (stamp)

Approved for Public Release
(Upon receipt of Clearance approval)
Further Dissemination Unlimited

For use with Technical Documents (when appropriate)	
EDC-	FMP-
EDT-	ECN-
Project No.:	Division: <i>CP</i>
Document Type: <i>Rpt.</i>	Page Count: <i>44</i>

For use with Speeches, Articles, or Presentations (when appropriate)			
Abstract	Summary	Full Paper	Visual Aid
Conference Name:			
Conference Date:			
Conference Location:			
Conference Sponsor:			
Published in:			
Publication Date:			

LEGAL DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Scientific or technical information is available to U.S. Government and U.S. Government contractor personnel through the Office of Scientific and Technical Information (OSTI). It is available to others through the National Technical Information Service (NTIS).

This report has been reproduced from the best available copy.

Printed in the United States of America

This page intentionally left blank.

CONTENTS

1.0	INTRODUCTION	1-1
1.1	PURPOSE	1-1
1.2	SCOPING PROCESS	1-1
1.3	PROJECT ASSUMPTIONS	1-3
1.4	EXISTING REFERENCES	1-4
1.5	LIST OF CONTAMINANTS OF POTENTIAL CONCERN	1-5
1.6	CONTAMINANT OF POTENTIAL CONCERN EXCLUSIONS	1-6
1.7	FINAL LIST OF CONTAMINANTS OF CONCERN	1-9
2.0	STATEMENT OF THE PROBLEM	2-1
3.0	IDENTIFY THE DECISION	3-1
4.0	IDENTIFY INPUTS TO THE DECISION	4-1
4.1	ANALYTICAL PERFORMANCE REQUIREMENTS	4-2
5.0	DECISION RULES	5-1
5.1	SELECTED SAMPLING DESIGN	5-4
5.1.1	Vadose Zone Drill Cuttings	5-5
5.1.2	Saturated Drill Cuttings	5-5
5.1.3	Personal Protective Equipment and Small-Volume Miscellaneous Waste	5-7
6.0	REFERENCES	6-1

FIGURES

Figure 1-1. Location Map for Proposed Monitoring Wells Associated with the 100-HR-3 Operable Units.....	1-2
Figure 5-1. Soil Cuttings Waste Disposition Flowchart.....	5-6

TABLES

Table 1-1. Summary of Existing References.....	1-4
Table 1-2. Contaminants of Potential Concern.....	1-6
Table 1-3. Contaminants of Potential Concern Exclusions and Justifications.....	1-7
Table 1- 4. Supporting Data for Contaminants of Potential Concern Exclusions	1-8
Table 3-1. Summary of Data Quality Objective Step 2 Information.....	3-1
Table 4-1. Required Information and Reference Sources.....	4-1
Table 5-1. Decision Rules.....	5-1

TERMS

AA	alternative action
AHERA	<i>Asbestos Hazard Emergency Response Act of 1986</i>
bgs	below ground surface
CERCLA	<i>Comprehensive Environmental Response, Compensation and Liability Act of 1980</i>
CLARC	<i>Cleanup Levels and Risk Calculations under the Model Toxics Control Act Regulation (CLARC Version 3.1) (Ecology 94-145)</i>
COC	contaminant of concern
COPC	contaminant of potential concern
CWC	Central Waste Complex
DQO	data quality objective
DR	decision rule
DS	decision statement
ERDF	Environmental Restoration Disposal Facility
ISRM	in situ redox manipulation
N/A	not applicable
PCB	polychlorinated biphenyl
PPE	personal protective equipment
PSQ	principal study question
TSCA	<i>Toxic Substances Control Act of 1976</i>
TSD	treatment, storage, and disposal
WAC	<i>Washington Administrative Code</i> ; waste acceptance criteria

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
<i>If You Know</i>	<i>Multiply By</i>	<i>To Get</i>	<i>If You Know</i>	<i>Multiply By</i>	<i>To Get</i>
Length			Length		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			Area		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.0836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			Mass (weight)		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
ton	0.907	metric ton	metric ton	1.102	ton
Volume			Volume		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
cups	0.24	liters	liters	0.264	gallons
pints	0.47	liters	cubic meters	35.315	cubic feet
quarts	0.95	liters	cubic meters	1.308	cubic yards
gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			Temperature		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			Radioactivity		
picocuries	37	millibecquerel	millibecquerel	0.027	picocuries

1.0 INTRODUCTION

1.1 PURPOSE

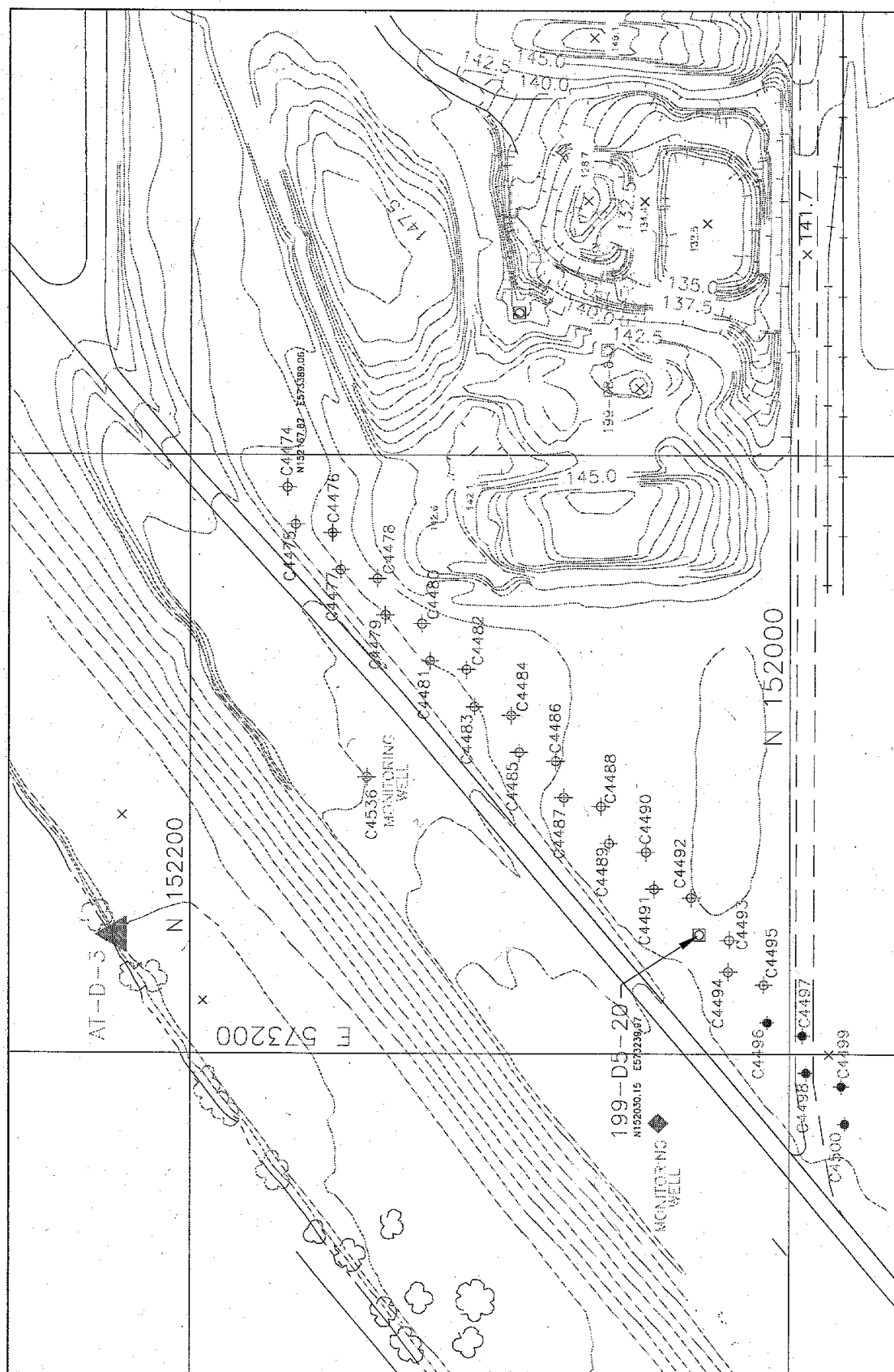
The purpose of this data quality objective (DQO) summary report is to develop a sampling plan for waste disposition of soil cuttings and other drilling-related wastes that will result from the drilling of 21 injection wells and one groundwater monitoring well west of the 184-D Powerhouse Ash Pit in the 100-D Area of the Hanford Site. The 21 In Situ Redox Manipulation (ISRM) wells will inject treatment solutions to assist in intercepting and preventing the discharge of a hexavalent chromium plume to the Columbia River. The monitoring well will help establish groundwater chemistry downgradient of the ISRM zone. The proposed well locations are shown in Figure 1-1.

1.2 SCOPING PROCESS

During the scoping process, the vadose and saturated zone soils were determined to be low risk. This determination was based on location and process knowledge.

Vadose zone soils are thought to be uncontaminated for the planned wells, because these monitoring well locations are outside of waste site boundaries with no current or historical underground waste or product pipelines in the vicinity. However, field screening and visual observations will be used to verify that contamination is not present. If field screening or visual observations identify contamination, then sampling will be completed.

During the scoping process, consideration was given to the possibility of contaminants of potential concern (COPC) having migrated from proximal waste sites and sorbed onto sediments in the location of the planned monitoring wells. The primary liquid waste sites of concern were the 107 D/DR Retention Basins. These retention basins leaked large volumes of reactor coolant water containing chromium and radionuclides. Simulated water table maps showed that the leaked water created a mound, which changed the groundwater gradient and flow direction. WMP-18442, *Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 100-HR-3 Monitoring Wells*, (hereafter referred to as the 100-HR-3 Operable Unit [OU] DQO), was reviewed to avoid duplicative efforts identifying and excluding COPCs. The close proximity of the sites investigated under WMP-18442 make them a good reference for characterization of the proposed sites in this document. In the 100-HR-3 OU DQO, the records of decision for the 100-DR-1, 100-DR-2, and 100-HR-3 OUs (EPA/ROD/R10-00/121, *Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Units*; EPA/ROD/R10-96/134, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units*) and DOE/RL-93-43, *Limited Field Investigation Report for the 100-HR-3 Operable Unit*, were reviewed, and the COPCs from those documents were considered for applicability. The COPCs that were excluded (determined to not be contaminants of concern [COC]) for those sites were similarly excluded from this investigation, so that only the final COCs in the 100-HR-3 OU DQO will be treated as COPCs for purposes of this document.



In the 100-HR-3 OU DQO, sediments from the historical high-groundwater elevation for each monitoring well location were identified as potentially sorbing COPCs and thus becoming contaminated. Distribution coefficients and proximal groundwater analytical data were evaluated to determine the COPCs to be excluded. Thus, those contaminants that were not eliminated were identified as constituents to be analyzed. The final COCs for the saturated zone were as follows: tritium; Th-228/232/234; Sr-90; gross alpha and beta; nitrate; nitrite; copper; arsenic; Chromium III and VI; aluminum; and ammonia/ammonium. During the drilling of two of the three wells covered by the 100-HR-3 OU DQO (C4185 and C4187), samples were taken of vadose zone soils below the historical high groundwater mark, as well as from soils in the saturated zone. These soil samples were analyzed for each of the radioactive and nonradioactive COCs. Additionally, the *Virtual Library* (Hanford Site database) was reviewed and compared with groundwater constituent results for the 100-HR-3 OU DQO COCs in four groundwater wells upgradient of the proposed drilling sites. The *Virtual Library* groundwater results were found to be at lower concentrations in the four upgradient wells than in the wells reviewed in the 100-HR-3 OU DQO. These soil and groundwater analytical results justify the exclusion of all COCs for the proposed drilling sites.

Summary information on references used during the scoping process is presented in Table 1-1.

1.3 PROJECT ASSUMPTIONS

The following project assumptions were considered while preparing this DQO summary report.

- All waste generated from the installation of ISRM wells C4474 through C4494 and groundwater monitoring well C4536 shall be managed in accordance with DOE/RL-97-01, *Interim Action Waste Management Plan for the 100-HR-3 and 100-KR-4 Operable Units*.
- Because the proposed boreholes will be completed as *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) wells, the waste generated from drilling and sampling operations shall be handled as CERCLA waste.
- Saturated drill cuttings or other waste that has come into contact with the groundwater will carry no listed waste codes (CCN 0542880, "Waste Designation: Hanford Site Groundwater Contacted Wastes").
- Purgewater shall be designated based on process knowledge (Table 1-1) and shall be collected and contained at the wellhead until it is transported to either the Purgewater Storage and Treatment Facility or, if waste-acceptance criteria can be met, to the Effluent Treatment Facility. Purgewater, groundwater samples, and decontamination fluids generated during well drilling, sample screening, and analysis shall be managed as purgewater in accordance with purgewater guidance provided in letter 90-ERB-040, "Strategy for Handling and Disposing of Purgewater at the Hanford Site, Washington."
- Personal protective equipment (PPE) and miscellaneous solid waste (e.g., wipes) generated from work in the vadose zone shall be designated using the vadose zone

drill-cuttings profile (see Chapter 5.0). The PPE and miscellaneous solid wastes generated from work in the saturated zone will be designated according to the saturated-zone drill-cuttings profile.

1.4 EXISTING REFERENCES

Table 1-1 lists the references that were reviewed as part of the scoping process and provides a brief narrative summary of the pertinent information contained in each reference.

Table 1-1. Summary of Existing References. (2 Pages)

Reference	Summary of Pertinent Information
<i>Hanford Site Atlas</i> , BHI-01119	Provides maps of the 100-D/DR Area locating unplanned releases, waste sites, and facilities. No unplanned releases were identified in the areas planned for drilling.
M-1904-D Sheet 5, M-1-9603-DR, H-1901-D Sheet 5, and H-1-4046	Provide underground pipeline locations and descriptions. Based on these maps, the underground pipelines that are in the vicinity of the boreholes carried the following: river water, sanitary water, filtered water, sodium silicate, sodium dichromate, process sewer, and acids (oxalic, sulfuric, etc.). Export water lines are currently active in the area of borehole C4187. The maps also identified facilities such as the 126-D-2 (184-D Coal Pit), 182 D Reservoir and Pump House, and the 183 D Filter Plant Building.
<i>Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 100-HR-3 Monitoring Wells</i> , WMP-18442	Provides the data quality objectives for three proximal, upgradient wells, including the justification for excluding contaminants of potential concern for those drilling sites. Only those contaminants of concern that were not excluded in that document will be considered as contaminants of potential concern for this project. Also provides information on waste sites in the 100 D/DR Area, as well as current and historical groundwater data. Summarizes information from the following documents: <ul style="list-style-type: none"> • <i>100-D Area Technical Baseline Report</i>, WHC-SD-EN-TI-181 • <i>Declaration of the Record of Decision for the 100-BC-1, 100-DR-1 and 100-HR-1 Operable Units</i>, EPA/541/R-99/039 • <i>Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units</i>, EPA/ROD/R10-96/134 • <i>Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Unit</i>, EPA/ROD/R10-00/121 • <i>Limited Field Investigation Report for the 100-HR-3 Operable Unit</i>, DOE/RL-93-43.
"Application of Listed Waste Codes to Secondary Solid Wastes Related to Well Construction, Maintenance, and Sampling," CCN 081034	Provides justification for not assigning listed waste codes to the waste in the saturated zone from this project.
"Waste Designation: Hanford Site Groundwater Contacted Wastes," CCN 0542880	Provides specific guidance on the designation of groundwater-contacted waste. Addresses characteristics, persistent, and toxic wastes, and landfill restrictions. Based on this designation, soils and associated drilling materials would not be designated as characteristic, persistent, or toxic waste and there would not be any landfill restrictions.

Table 1-1. Summary of Existing References. (2 Pages)

Reference	Summary of Pertinent Information
<i>Conceptual Site Models for Groundwater Contamination at 100-BC-5, 100-KR-4, 100-HR-3, and 100-FR-3 Operable Units, BHI-00917</i>	Provides a simulated water table map for the 100-D/DR Area during 1955. This groundwater map identifies a groundwater mound under the 107 D/DR Retention Basins. The mounding depicted creates a groundwater flow direction radial outward from the retention basins. The mound appears to alter the gradient to the south beyond the 190 DR Storage Building.
<i>Interim Action Waste Management Plan for the 100-HR-3 and 100-KR-4 Operable Units, DOE/RL-97-01, Rev. 3</i>	Identifies how waste generated in the 100-HR-3 Operable Unit should be managed. Drill cuttings from outside of an area of known or suspect contamination will be collected in stockpiles near the point of generation.
<i>Virtual Library</i>	Provides groundwater elevations and analytical results for Hanford Site wells. The historical high groundwater elevation, based on well 199-D5-20, was 120.26 m on June 25, 1997. Thus, the saturated zone should extend from 23.5 m (77 ft) to total depth for all well installations. During this investigation, the following 100 D Area wells were reviewed: 199-D4-14, 199-D4-15, 199-D5-12, 199-D5-13, 199-D5-20, 199-D5-36, 199-D5-37, and 199-D5-44. Analytical results were provided for 1963 to the present for the following constituents: Sr-90, Th-228, Th-232, tritium, gross alpha, gross beta, aluminum, arsenic, copper, nitrate, nitrite, ammonia, chromium III, and chromium VI.
Fetter, C. W., <i>Contaminant Hydrogeology</i>	Provides pertinent discussion on transport, transformation, retardation, and attenuation of solutes within the aquifer and the vadose zone.

BHI-00917, *Conceptual Site Model for Groundwater Contamination at 100-BC-5, 100-KR-4, 100-HR-3, and 100-FR-3 Operable Units.*

BHI-01119, *Hanford Site Atlas.*

CCN 0542880, "Waste Designation: Hanford Site Groundwater Contacted Wastes."

CCN 081034, "Application of Listed Waste Codes to Secondary Solid Waste Related to Well Construction, Maintenance, and Sampling."

DOE/RL-93-43, *Limited Field Investigation Report for the 100-HR-3 Operable Unit.*

DOE/RL-97-01, *Interim Action Waste Management Plan for the 100-HR-3 and 100-KR-4 Operable Unit.*

EPA/541/R-99/039, *Declaration of the Record of Decision for the 100-BC-1, 100-DR-1 and 100-HR-1 Operable Units.*

EPA/ROD/R10-96/134, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units.*

EPA/ROD/R10-00/121, *Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Units.*

Fetter, C. W., *Contaminant Hydrogeology.*

H-1-4046, *100D and DR Areas Process Waste System.*

H-1-9603-DR, *100-DR Water Plant General Site Plan at 100-D, Hanford Site Drawing.*

M-1901-D Sheet 5, *Lines & Underground Water at 100-D Area, Hanford Site Drawing.*

M-1904-D Sheet 5, *Outside Lines – Sewers at 100-D Area, Hanford Site Drawing.*

Virtual Library, Hanford Site database.

WHC-SD-EN-TI-181, *100-D Area Technical Baseline Report.*

WMP-18442, *Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 100-HR-3 Monitoring Wells.*

1.5 LIST OF CONTAMINANTS OF POTENTIAL CONCERN

Table 1-2 lists all of the chemicals and radionuclides revealed during the scoping process. The list comprises the COCs for the three wells installed in the 100-HR-3 OU in 2003.

The analytes identified during the scoping process will be further evaluated and eventually will be used to designate the following project waste streams:

- Vadose zone drill cuttings (if field screening or visual observations indicate the presence of contamination)
- Saturated zone drill cuttings
- Purgewater and decontamination fluids
- PPE and small-volume miscellaneous solid waste that has contacted contaminated media.

Purgewater and decontamination fluids shall be designated based on process knowledge and the guidance cited in Section 1.3. Similarly, PPE and small-volume miscellaneous solid waste will be segregated depending on whether the waste was generated during vadose zone drilling or saturated drilling and whether it has contacted contaminated media. Miscellaneous solid waste that has not contacted contaminated media maybe disposed of as no-radiation-added/nonhazardous waste. Other waste will be designated based on the appropriate waste profile (i.e., vadose zone or saturated zone waste).

Table 1-2. Contaminants of Potential Concern.

Radioactive Contaminants of Potential Concern			
Gross alpha and beta	Sr-90	Th-228/232/234	Tritium
Inorganic Contaminants of Potential Concern			
Aluminum	Arsenic	Copper	Nitrite
Ammonia/Ammonium	Chromium III and VI	Nitrate	

1.6 CONTAMINANT OF POTENTIAL CONCERN EXCLUSIONS

Table 1-3 lists all saturated zone COPCs to be excluded from the investigation. These exclusions are based on (1) agreed-upon models and physical properties of the radiological and nonradiological constituents or (2) regulator standards for the chemical constituents. Table 1-3 also provides the specific rationale for the exclusion of each of the identified COPCs. Note that cleanup levels identified in WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards," are more restrictive than those in WAC 173-303, "Dangerous Waste Regulations;" therefore, if the exclusion was based on WAC 173-340-740, it is also less than WAC 173-303.

Table 1-3. Contaminants of Potential Concern Exclusions and Justifications. (2 Pages)

Contaminants of Potential Concern	Rationale for Exclusion
Aluminum, Arsenic	Constituents were excluded because their concentration in soil samples from wells C4185 and C4187, as well as their derived concentrations using an adsorption modeling equation ($C[\text{soil}] = C[\text{groundwater}] \text{ times constituent's distribution coefficient } [K_d]$) on proximal groundwater results, show their concentrations to be less than the 90th percentile background level for eastern Washington State per Ecology 94-115, <i>Natural Background Soil Metals Concentrations in Washington State</i> .
Ammonia/Ammonium	Contaminant is not a Washington State toxic or persistent waste, and is neither a toxicity characteristic constituent nor an underlying hazardous constituent. Also, soils samples from wells C4185 and C4187 were below WAC 173-340-740 target Method B soil cleanup levels protective of groundwater.
Copper, Nitrate, Strontium-90	Constituents were run through an adsorption modeling equation based on the linear relationship between the concentration of a solute and the amount of it that will be sorbed onto a solid, as explained by C. W. Fetter in <i>Contaminant Hydrogeology</i> (page 117). Essentially, the concentration in the soil is equal to the concentration in the groundwater multiplied by the solute's distribution coefficient (K_d), i.e. $C_{\text{SOIL}} = C_{\text{aq}} * K_d$. Each nonradioactive constituent was excluded if its C_{SOIL} was less than the lowest cleanup concentration found in WAC 173-340-740. Radioactive isotopes were excluded if their C_{SOIL} was less than their free-release as a nonradioactive limit. Further details for each contaminant of potential concern excluded for this reason are available in Table 1-4.
Nitrite	Constituent was analyzed for in soil samples from wells C4185 and C4187 as well as in proximal groundwater samples and has not been detected.
Chromium III	Highest reported groundwater concentration in proximal wells to C4185 and C4187 was 2260 µg/L and only 1340 µg/L in proximal wells to the proposed site. Because the highest concentration in C4185/C4187 vadose zone soil was 13.2 µg/L (below unrestricted cleanup levels), it can be concluded that the contaminant will meet unrestricted cleanup levels in vadose zone soils at the proposed site. For this purpose, proximal wells reviewed for C4185 and C4187 included 199-D4-14, 199-D4-15, 199-D5-12, 199-D5-13, and 199-D5-20. Proximal wells reviewed for the proposed sites included 199-D5-20, 199-D5-36, 199-D5-37, and 199-D5-44.
Chromium VI	Highest reported groundwater concentration in proximal wells to C4185 and C4187 was 2280 µg/L and only 1020 µg/L in proximal wells to the proposed site. Because the contaminant was below analytical detection limits in C4185/C4187 vadose zone soils, it can be concluded that the contaminant will meet unrestricted cleanup levels in vadose zone soils at the proposed site. For this purpose, proximal wells reviewed for C4185 and C4187 included 199-D4-14, 199-D4-15, 199-D5-12, 199-D5-13, and 199-D5-20. Proximal wells reviewed for the proposed sites included 199-D5-20, 199-D5-36, 199-D5-37, and 199-D5-44.
Tritium	Because tritium exists as part of the water molecule, its distribution coefficient (K_d) is 0 and it will not be sorbed onto vadose zone soils. Also, soils samples from wells C4185 and C4187 were analyzed, and tritium was not detected in them.
Gross Alpha	Highest reported groundwater concentration in proximal wells to C4185 and C4187 was 17 pCi/L and only 3.41 pCi/L in proximal wells to the proposed site. Because the contaminant was only found at 1.1 pCi/g in C4185/C4187 vadose zone soils, it can be concluded that the contaminant will meet the 5 pCi/g free release as a nonradioactive level in vadose zone soils at the proposed site. For this purpose, proximal wells reviewed for C4185 and C4187 included 199-D4-14, 199-D4-15, 199-D5-12, 199-D5-13, and 199-D5-20. Proximal wells reviewed for the proposed sites included 199-D5-20, 199-D5-36, 199-D5-37, and 199-D5-44.
Gross Beta	Highest reported groundwater concentration in proximal wells to C4185 and C4187 was 1000 pCi/L and only 74.9 pCi/L in proximal wells to the proposed site. Because the contaminant was only found at 0.79 pCi/g in C4185/C4187 vadose zone soils, it can be concluded that the contaminant will meet the 10 pCi/g free release as a nonradioactive level in vadose zone soils at the proposed site. For this purpose, proximal wells reviewed for C4185 and C4187 included 199-D4-14, 199-D4-15, 199-D5-12, 199-D5-13, and 199-D5-20. Proximal wells reviewed for the proposed sites included 199-D5-20, 199-D5-36, 199-D5-37, and 199-D5-44.

Table 1-3. Contaminants of Potential Concern Exclusions and Justifications. (2 Pages)

Contaminants of Potential Concern	Rationale for Exclusion
Th-228/230/232	The groundwater analytical results for the 8 proximal wells reviewed for this document and the 100-HR-3 Operable Unit data quality objectives document revealed only one positive result for a thorium isotope (Th-228, 36 pCi/L). All three isotopes were analyzed in C4185 and C4187 vadose zone soil samples, and the highest concentrations were 0.57 pCi/g for Th-228, 0.536 pCi/g for Th-230, and 0.786 pCi/g for Th-232, all of which are below the applicable HNF-EP-0063 radioactive release level of 2 pCi/g.

HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*

WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards."

WAC 173-340-747, "Deriving Soil Concentrations for Ground Water Protection."

Table 1- 4. Supporting Data for Contaminants of Potential Concern Exclusions

Nonrad COPC ^a	C _{GW} ^b	C _{GW} Units	C _{GW} Location	C _{GW} Date	K _d ^c (mL/g)	C _{soil} ^d (mg/kg)	Most Restrictive Protection level (mg/kg)
aluminum	1480.00	µg/L	199-D5-20	05/16/1992	4.50 E+01	6.66 E+01	28,299 (background)
arsenic	4.00	µg/L	199-D5-20	03/06/1993	2.90 E+01	1.16 E-01	7.61 (background)
copper	119.00	µg/L	199-D5-37	11/20/2003	2.20 E+01	2.62 E+00	5.00 E+01
nitrate	24800.00	µg/L	199-D5-20	11/20/2001	0.00 E+00	0.00 E+00	4.00 E+01
Rad COPC ^e	C _{GW}	C _{GW} Units	C _{GW} Location	C _{GW} Date	K _d (mL/g)	C _{soil} (pCi/g)	Free Release As Nonradioactive (pCi/g)
Sr-90	0.54	pCi/L	199-D5-20	11/02/1992	2.73 E+02	1.47 E-01	10

^a Nonradioactive contaminant of potential concern.

^b Mass of solute in solution in equilibrium with the mass of solute sorbed onto the solid.

^c Distribution coefficient (K_d) values were taken from Ecology 94-145, *Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation; CLARC, Version 3.1*, Table 3.1, for each listed contaminant. For radioactive contaminants not listed in CLARC, PNNL-13895, *Hanford Contaminant Distribution Coefficient Database and Users Guide*, was reviewed, and the highest listed K_d value for a groundwater aqueous phase was used in the equation.

^d Mass of solute sorbed per dry unit weight of solid.

^e Radioactive contaminant of potential concern.

The vadose zone soils are excluded from the remainder of this DQO process for the following reasons.

- No reported unplanned releases occurred near the proposed wells.
- The proposed well locations are outside any surface radiological waste site.

- There are no diagrams identifying underground structures that could contaminate vadose zone soils.

However, field screening will be completed to verify that volatile organic compounds and radionuclides are not present. If field screening identifies any elevated readings, then vadose soils will be characterized at the point of the highest detected field-screening readings.

1.7 FINAL LIST OF CONTAMINANTS OF CONCERN

No contaminants of concern will be carried through the rest of this process.

This page intentionally left blank.

2.0 STATEMENT OF THE PROBLEM

Field screening and visual observations are needed to confirm proper management and disposition of saturated zone waste (below the historical high-groundwater elevation) as a result of drilling, development, and completion of 22 new wells to be installed in the northwestern portion of the 100 D Area.

This page intentionally left blank.

3.0 IDENTIFY THE DECISION

If field screening or visual observations indicate contamination, then the problem of waste designation will be addressed by a series of principal study questions (PSQ) that will need to be answered. Table 3-1 presents the PSQs and the alternative actions that will be taken when each PSQ is answered, along with a description and severity rating of the consequences of implementing the wrong alternative actions. Each PSQ and the corresponding alternative actions then are combined into a decision statement.

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #1 – Is the material radiologically contaminated?			
1-1	Determine if the material is radiologically contaminated and evaluate material for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating clean material as if it were contaminated.	Low to moderate
1-2	Determine if the material is not radiologically contaminated and evaluate material for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Low to moderate
DS #1 – Determine if the material is radiologically contaminated and evaluate for treatment or disposal at the ERDF or CWC or if it is not radiologically contaminated and evaluate for disposal at the ERDF.			
PSQ #2a – Is the material a listed dangerous waste?			
Radiologically Contaminated:			
2a-1	Determine if the material is a listed dangerous waste and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating non-listed dangerous material as if it were listed.	Low to moderate
2a-2	Determine if the material is not a listed dangerous waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
Not Radiologically Contaminated:			
2a-3	The material has been determined as a listed dangerous waste and will be evaluated for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating non-listed dangerous material as if it were listed.	Low to moderate
2a-4	Determine if the material is not a listed dangerous waste and evaluate for return to the ground or for disposal at a solid waste landfill.	Public may be exposed to listed dangerous waste.	Severe
Radiologically Contaminated:			
DS #2a-1 – Determine if the material is a listed dangerous waste and will be evaluated for treatment or disposal at the ERDF or CWC OR if the material is not a listed dangerous waste and will be evaluated for disposal at the ERDF.			
Not Radiologically Contaminated:			
DS #2a-2 – Determine if the material is a listed dangerous waste and will be evaluated for disposal at the ERDF or an offsite TSD unit OR if the material is not a listed dangerous waste and will be evaluated for return to the ground or for disposal at a solid waste landfill.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #2b – Is the material a characteristic waste (e.g., ignitable, corrosive, reactive, or toxic)?			
<u>Radiologically Contaminated:</u>			
2b-1	Determine if the material is a characteristic dangerous waste and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating noncharacteristic dangerous material as if it were characteristic.	Low to moderate
2b-2	Determine if the material is not a characteristic dangerous waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
<u>Not Radiologically Contaminated:</u>			
2b-3	Determine if the material is a characteristic dangerous waste and evaluate for disposal at the ERDF or an offsite TSD unit.	Unnecessary cost of treating noncharacteristic dangerous material as if it were characteristic.	Low to moderate
2b-4	Determine if the material is not a characteristic dangerous waste and evaluate for return to the ground or for disposal at a solid waste landfill.	Public may be exposed to characteristic waste.	Severe
<u>Radiologically Contaminated:</u>			
DS # 2b-1 – Determine if the material is a characteristic waste and will be evaluated for treatment or disposal at the ERDF or CWC OR if the material is not a characteristic waste and will be evaluated for disposal at the ERDF.			
<u>Not Radiologically Contaminated:</u>			
DS # 2b-2 – Determine if the material is a characteristic waste and will be evaluated for disposal at the ERDF or offsite TSD unit OR if the material is not a characteristic waste and will be evaluated for return to the ground or for disposal at a solid waste landfill.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #2c – Is the material a toxic dangerous waste as defined by Washington State criteria?			
<u>Radiologically Contaminated:</u>			
2c-1	Determine if the material is a toxic dangerous waste and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating non-toxic material as if it were toxic.	Low to moderate
2c-2	Determine if the material is not a toxic dangerous waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
<u>Not Radiologically Contaminated:</u>			
2c-3	Determine if the material is a toxic dangerous waste and evaluate for disposal at the ERDF or an offsite TSD unit.	Unnecessary cost of treating non-toxic material as if it were toxic.	Low to moderate
2c-4	Determine if the material is not a toxic dangerous waste and evaluate for return to the ground or for disposal at a solid waste landfill.	Public may be exposed to toxic dangerous waste.	Severe
<u>Radiologically Contaminated:</u>			
DS #2c-1 – Determine if the material is a toxic dangerous waste and will be evaluated for treatment or disposal at the ERDF or CWC OR if the material is not a toxic dangerous waste and will be evaluated for disposal at the ERDF.			
<u>Not Radiologically Contaminated:</u>			
DS #2c-2 – Determine if the material is a toxic dangerous waste and will be evaluated for disposal at the ERDF or an offsite TSD unit OR if the material is not a toxic dangerous waste and will be evaluated for return to the ground or for disposal at a solid waste landfill.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #2d – Is the material a persistent waste as defined by Washington State criteria?			
<u>Radiologically Contaminated:</u>			
2d-1	Determine if the material is a persistent dangerous waste and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating nonpersistent material as if it were persistent.	Low to moderate
2d-2	Determine if the material is not a persistent dangerous waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
<u>Not Radiologically Contaminated:</u>			
2d-3	Determine if the material is a persistent dangerous waste and evaluate for disposal at the ERDF or an offsite TSD unit.	Unnecessary cost of treating nonpersistent material as if it were persistent.	Low to moderate
2d-4	Determine if the material is not a persistent dangerous waste and evaluate for return to the ground or for disposal at a solid waste landfill.	Public may be exposed to persistent waste.	Severe
<u>Radiologically Contaminated:</u>			
DS #2d-1 – Determine if the material is a persistent waste and will be evaluated for treatment or disposal at the ERDF or CWC <u>OR</u> if the material is not a persistent waste and will be evaluated for disposal at the ERDF.			
<u>Not Radiologically Contaminated:</u>			
DS #2d-2 – Determine if the material is a persistent waste and will be evaluated for disposal at the ERDF or an offsite TSD unit <u>OR</u> if the material is not a persistent waste and will be evaluated for return to the ground or for disposal at a solid waste landfill.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #2e – Does the material exceed WAC 173-340-740 Method B cleanup levels?			
<u>Radiologically Contaminated:</u>			
2e-1	Determine if the material is above WAC-173-340-740 Method B cleanup levels and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating non-WAC-173-340-740 Method B contaminated material as if it were contaminated.	Low to moderate
2e-2	Determine if the material is not above WAC-173-340-740 Method B cleanup levels and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
<u>Not Radiologically Contaminated:</u>			
2e-3	Determine if the material is above WAC-173-340-740 Method B cleanup levels and evaluate for disposal at the ERDF or offsite TSD unit.	Unnecessary cost of treating non-WAC-173-340-740 Method B contaminated material as if it were contaminated.	Low to moderate
2e-4	Determine if the material is not above WAC-173-340-740 Method B cleanup levels and evaluate for return to the ground or for disposal at a solid waste landfill.	Public may be exposed to wastes contaminated above WAC-173-340-740 Method B cleanup levels.	Severe
<u>Radiologically Contaminated:</u>			
DS # 2e-1 – Determine if the material is above WAC-173-340-740 Method B cleanup levels and will be evaluated for treatment or disposal at the ERDF or CWC OR if the material is not above the WAC-173-340-740 Method B cleanup levels and will be evaluated for disposal at the ERDF.			
<u>Not Radiologically Contaminated:</u>			
DS # 2e-2 – Determine if the material is above WAC-173-340-740 Method B cleanup levels and will be evaluated for disposal at the ERDF or an offsite TSD unit OR if the material is not above the WAC-173-340-740 Method B cleanup levels and will be evaluated for return to the ground or for disposal at a solid waste landfill.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #2f – Is the material a PCB waste?			
<u>Radiologically Contaminated:</u>			
2f-1	Determine if the material is a PCB waste and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating non-PCB waste as if it were PCB waste.	Low to moderate
2f-2	Determine if the material is not a PCB waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
<u>Not Radiologically Contaminated:</u>			
2f-3	Determine if the material is a PCB waste and evaluate for disposal at the ERDF or offsite TSD unit.	Unnecessary cost of treating non-PCB waste as if it were PCB waste.	Low to moderate
2f-4	Determine if the material is not a PCB waste and evaluate for return to the ground or for disposal at a solid waste landfill.	Waste placed in the ERDF would be misclassified.	Severe
<u>Radiologically Contaminated:</u> DS #2f-1 – Determine if the material is a PCB waste and will be evaluated for treatment or disposal at the ERDF or CWC OR if the material is not a PCB waste and will be evaluated for disposal at the ERDF.			
<u>Not Radiologically Contaminated:</u> DS #2f-2 – Determine if the material is a PCB waste and will be evaluated for disposal at the ERDF or an offsite TSD unit OR if the material is not a PCB waste and will be evaluated for return to the ground or for disposal at a solid waste landfill.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/Severe)
PSQ #2g – Is the material an asbestos waste?			
<u>Radiologically Contaminated:</u>			
2g-1	Determine if the material is an asbestos waste and evaluate for treatment or disposal at the ERDF or CWC.	Unnecessary cost of treating non-asbestos waste as if it were asbestos waste.	Low to moderate
2g-2	Determine if the material is not an asbestos waste and evaluate for disposal at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
<u>Not Radiologically Contaminated:</u>			
2g-3	Determine if the material is an asbestos waste and evaluate for disposal at the ERDF or an offsite TSD unit.	Unnecessary cost of treating non-asbestos waste as if it were asbestos waste.	Low to moderate
2g-4	Determine if the material is not an asbestos waste and evaluate for return to the ground or disposal at a solid waste landfill.	Public may be exposed to an asbestos waste.	Severe
<u>Radiologically Contaminated:</u>			
DS #2g-1 – Determine if the material is an asbestos waste and will be evaluated for treatment or disposal at the ERDF or CWC OR if the material is not an asbestos waste and will be evaluated for disposal at the ERDF.			
<u>Not Radiologically Contaminated:</u>			
DS #2g-2 – Determine if the material is an asbestos waste and will be evaluated for disposal at the ERDF or an offsite TSD unit OR if the material is not an asbestos waste and will be evaluated for return to the ground or for disposal at a solid waste landfill.			
PSQ #3 – Does the material's radiological activity exceed the disposal facility's waste acceptance criteria limits?			
3-1	Determine if the radiological composition of the waste material does exceed the ERDF waste acceptance criteria and therefore requires disposal at CWC.	Unnecessary disposal cost of treating waste material as if it exceeded the ERDF radiological waste acceptance criteria.	Low to moderate
3-2	Determine if the radiological composition of the waste material does not exceed the ERDF waste acceptance criteria and therefore can be disposed of at the ERDF.	Waste placed in the ERDF would be misclassified.	Moderate
DS #3 – Determine if the material does exceed the ERDF radiological waste acceptance criteria and must be disposed of at the CWC or if the material does not exceed the ERDF radiological waste acceptance criteria and can be disposed of at the ERDF.			

Table 3-1. Summary of Data Quality Objective Step 2 Information. (8 pages)

PSQ AA#	Description of Alternative Action	Description of Consequences of Implementing the Wrong Alternative Action	Severity of Consequences (Low/Moderate/ Severe)
PSQ #4 – Is the material land-disposal restricted?			
4-1	Determine if the material is land-disposal restricted and treat material before disposal.	Unnecessary cost of treating clean material as if it were land-disposal restricted.	Low to moderate
4-2	Determine if the material is not land-disposal restricted and do not treat the material before disposal. Dispose of the material in an onsite or offsite facility without treatment.	Public may be exposed to land-disposal-restricted waste.	Severe
DS #4 – Determine if the material is land-disposal restricted and requires treatment before disposal or if the material is not land-disposal restricted and may be disposed of in an onsite or offsite facility without treatment.			

AA = alternative action.

CWC = Central Waste Complex.

DS = decision statement.

ERDF = Environmental Restoration Disposal Facility.

TSD = treatment, storage, and disposal.

PCB = polychlorinated biphenyl.

PSQ = principal study question.

4.0 IDENTIFY INPUTS TO THE DECISION

If field screening or visual observations indicate contamination, this section will be updated to identify the input needed to resolve each of the decision statements identified in Chapter 3.0. Table 4-1 shows that data already exist and are sufficient to resolve each decision statement.

Table 4-1. Required Information and Reference Sources. (2 pages)

DS #	Remediation Variable	Required Data	Do Data Exist? (Y/N)	Source Reference	Sufficient Quality? (Y/N)	Additional Information Required? (Y/N)
1	Information on radiological composition of waste	Requirements specified in HNF-EP-0063	Y	<i>Virtual Library</i> data provide radionuclide concentration levels detected in proximal groundwater wells from 1963 to present. Data indicate that most of the constituents would not be of concern.	Y	N
2a	Information on listed dangerous waste codes that apply to the waste	Listed dangerous waste code status	Y	CCN 081034 and CCN 0542880 provide information for not applying listed waste codes for groundwater in the 100 D/DR Area.	Y	N
2b	Information on characteristic waste codes that apply to the waste	Characteristic waste code status	Y	CCN 0542880 provides a designation for groundwater-contacted waste. This designation determines that soils and other associated wastes are not characteristic wastes.	Y	N
2c	Information on toxic waste codes that apply to the waste	Toxic waste code status	Y	CCN 0542880 provides a designation for groundwater-contacted waste. This designation determines that soils and other associated wastes are not toxic wastes.	Y	N
2d	Information on persistent waste codes that apply to the waste	Persistent waste code status	Y	CCN 0542880 provides a designation for groundwater-contacted waste. This designation determines that soils and other associated wastes are not persistent wastes.	Y	N
2e	Information on chemical composition of waste for comparison against WAC 173-340-740 Method B risk levels	Information specified in WAC 173-340-740 Method B	Y	<i>Virtual Library</i> data provide nonradiological concentrations detected in proximal groundwater wells. Analytical data, process knowledge, and constituent physical properties allowed for the exclusion of several constituents. However, the constituents in Table 1-4 still need to be evaluated.	Y	N

Table 4-1. Required Information and Reference Sources. (2 pages)

DS #	Remediation Variable	Required Data	Do Data Exist? (Y/N)	Source Reference	Sufficient Quality? (Y/N)	Additional Information Required? (Y/N)
2f	PCB concentrations	TSCA	Y	<i>Virtual Library</i> data provide PCB concentrations detected in proximal groundwater wells. Analytical data, process knowledge, and PCB physical properties allowed for the exclusion of PCBs.	Y	N
2g	Asbestos concentrations	AHERA	Y	Process knowledge and asbestos physical properties allow for the exclusion of asbestos.	N/A	N
3	Information on radiological composition of waste	Requirements specified in HNF-EP-0063	Y	<i>Virtual Library</i> data provide radionuclide concentration levels detected in proximal groundwater wells from 1963 to present. Data indicate that most of the constituents would not be of concern.	Y	N
4	Information regarding land-disposal-restricted materials	Requirements specified in 40 CFR 268.40	Y	<i>Virtual Library</i> data provide nonradiological concentrations detected in proximal groundwater wells. Analytical data, process knowledge, and constituent physical properties provide sufficient evidence that the material will not be land-disposal restricted.	Y	N

40 CFR 268.40, "Land Disposal Restrictions."

Asbestos Hazard Emergency Response Act of 1986, 15 USC 2641, et seq.

CCN 0542880, "Waste Designation: Hanford Site Groundwater Contacted Wastes."

CCN 081034, "Application of Listed Waste Codes to Secondary Solid Wastes Related to Well Construction, Maintenance, and Sampling."

HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*.

Toxic Substances Control Act of 1976, 15 USC 2601, et seq.

Virtual Library, Hanford Site database.

WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards."

AHERA = *Asbestos Hazard Emergency Response Act of 1986*.

DS = decision statement.

N/A = not applicable.

PCB = polychlorinated biphenyl.

TSCA = *Toxic Substances Control Act of 1976*.

4.1 ANALYTICAL PERFORMANCE REQUIREMENTS

Because no data are necessary to resolve the decision statements for waste generated while drilling through the vadose and saturated zones, no level of analytical performance is required.

5.0 DECISION RULES

Table 5-1 presents the decision rules that correspond to each of the decision statements identified in Table 3-1.

Table 5-1. Decision Rules. (4 pages)

DS #	DR #	Decision Rule
1	1	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration of radionuclides in drill cuttings does exceed the criteria for being released as "nonradioactive" in accordance with HNF-EP-0063, treat the material as radiologically contaminated and evaluate the material for disposal at the ERDF or CWC. Proceed to DS #2a. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration of radionuclides in drill cuttings does not exceed the criteria for being released as "nonradioactive" in accordance with HNF-EP-0063, then evaluate for disposal at the ERDF, an offsite TSD unit, a solid waste landfill, or return to the ground. Proceed to DS #2a.
2a	2a	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are radiologically contaminated and are a listed dangerous waste, evaluate for treatment or disposal at the ERDF or CWC. Proceed to DS #2b. 2. If the maximum concentration shows that drill cuttings are radiologically contaminated and are not a listed dangerous waste, then evaluate for treatment or disposal at the ERDF. Proceed to DS #2b. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are not radiologically contaminated and are a listed dangerous waste, evaluate for disposal at the ERDF. Proceed to DS #2b. 2. If the maximum concentration shows that drill cuttings are not radiologically contaminated and are not a listed dangerous waste, evaluate for return to the ground or for disposal at a solid waste landfill. Proceed to DS #2b.

Table 5-1. Decision Rules. (4 pages)

DS #	DR #	Decision Rule
2b	2b	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a characteristic dangerous waste, treat the material as a radiologically contaminated characteristic dangerous waste and evaluate for disposal at the ERDF or CWC. Proceed to DS #2c. 2. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a characteristic dangerous waste, do not treat the material as a characteristic dangerous waste and evaluate for disposal at the ERDF. Proceed to DS #2c. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a characteristic dangerous waste, treat the material as a characteristic dangerous waste and evaluate for disposal at the ERDF or an offsite TSD unit. Proceed to DS #2c. 2. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a characteristic dangerous waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the ground or for disposal at a solid waste landfill. Proceed to DS #2c.
2c	2c	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a toxic dangerous waste, treat the material as a radiologically contaminated toxic dangerous waste and evaluate for disposal at the ERDF or CWC. Proceed to DS #2d. 2. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a toxic dangerous waste, do not treat the material as a toxic dangerous waste and evaluate for disposal at the ERDF. Proceed to DS #2d. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a toxic dangerous waste, treat the material as a toxic dangerous waste and evaluate for disposal at the ERDF or an offsite TSD unit. Proceed to DS #2d. 2. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a toxic dangerous waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the ground or for disposal at a solid waste landfill. Proceed to DS #2d.

Table 5-1. Decision Rules. (4 pages)

DS #	DR #	Decision Rule
2d	2d	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a persistent dangerous waste, treat the material as a radiologically contaminated persistent dangerous waste and evaluate for disposal at the ERDF or CWC. Proceed to DS #2e. 2. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a persistent dangerous waste, do not treat the material as a persistent dangerous waste and evaluate for disposal at the ERDF. Proceed to DS #2e. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a persistent dangerous waste, treat the material as a persistent dangerous waste and evaluate for disposal at the ERDF or an offsite TSD unit. Proceed to DS #2e. 2. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a persistent dangerous waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the ground or for disposal at a solid waste landfill. Proceed to DS #2e.
2e	2e	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do exceed the WAC 173-340-740 cleanup levels, treat the material as radiologically contaminated and evaluate for disposal at the ERDF or CWC. Proceed to DS #2f. 2. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the WAC 173-340-740 cleanup levels, treat the material as radiologically contaminated and evaluate for disposal at the ERDF or CWC. Proceed to DS #2f. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 3. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do exceed the WAC 173-340-740 cleanup levels, treat the material as chemically contaminated and evaluate for disposal at the ERDF. Proceed to DS #2f. 4. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the WAC 173-340-740 cleanup levels, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the ground or for disposal at a solid waste landfill. Proceed to DS #2f.

Table 5-1. Decision Rules. (4 pages)

DS #	DR #	Decision Rule
2f	2f	<p>Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a PCB waste, treat the material as a radiologically contaminated PCB waste and evaluate for disposal at the ERDF or CWC. Proceed to DS #3. 2. If the maximum concentration shows that drill cuttings are radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a PCB waste, do not treat the material as a PCB waste and evaluate for disposal at the ERDF. Proceed to DS #3. <p>Not Radiologically Contaminated:</p> <ol style="list-style-type: none"> 1. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do exceed the criteria for being a PCB waste, treat the material as a PCB waste and evaluate for disposal at the ERDF or an offsite TSD unit. Proceed to DS #3. 2. If the maximum concentration shows that drill cuttings are not radiologically contaminated and that chemical concentrations in drill cuttings do not exceed the criteria for being a PCB waste, do not treat the material as a radiologically or chemically contaminated waste and evaluate for return to the ground or for disposal at a solid waste landfill. Proceed to DS #3.
3	3	<p>Radiologically Contaminated: If the maximum concentration of radionuclides in drill cuttings does exceed the disposal facility waste acceptance criteria, evaluate the waste for chemical waste designation and negotiate disposition with the regulators. Proceed to DS #4.</p> <p>Not Radiologically Contaminated: If the maximum concentration of radionuclides in drill cuttings does not exceed the disposal facility waste acceptance criteria, evaluate the waste for chemical waste designation and dispose of material in an approved facility. Proceed to DS #4.</p>
4	4	<p>Radiologically Contaminated: If process knowledge or analytical results do dictate land-disposal restriction-imposed treatment, the material shall be treated and disposed of at the ERDF or sent to CWC.</p> <p>Not Radiologically Contaminated: If process knowledge or analytical results do not dictate land-disposal restriction-imposed treatment, the material shall be disposed of at the ERDF or an offsite TSD unit.</p>

HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*.

WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards."

CWC = Central Waste Complex.

ERDF = Environmental Restoration Disposal Facility.

DR = decision rule.

PCB = polychlorinated biphenyl.

DS = decision statement.

TSD = treatment, storage, and disposal.

5.1 SELECTED SAMPLING DESIGN

No sampling is necessary, based on this DQO and previous analytical data from this area.

Sections 5.1.1 through 5.1.3 provide details for the disposition of the vadose zone drill cuttings, saturated zone drill cuttings, decontamination fluids, well purgewater, PPE, and small-volume miscellaneous waste.

If field screening or visual observations indicate that contamination is present, then the constituents in the COPC list will be analyzed and the process flow diagram presented in Figure 5-1 shall be used to determine where the waste will be disposed of.

An offsite determination by the U.S. Environmental Protection Agency (in accordance with 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan") is required for waste that has contacted contaminated media (i.e., does not meet the Environmental Restoration Disposal Facility waste acceptance criteria) and is subsequently shipped offsite for disposal.

5.1.1 Vadose Zone Drill Cuttings

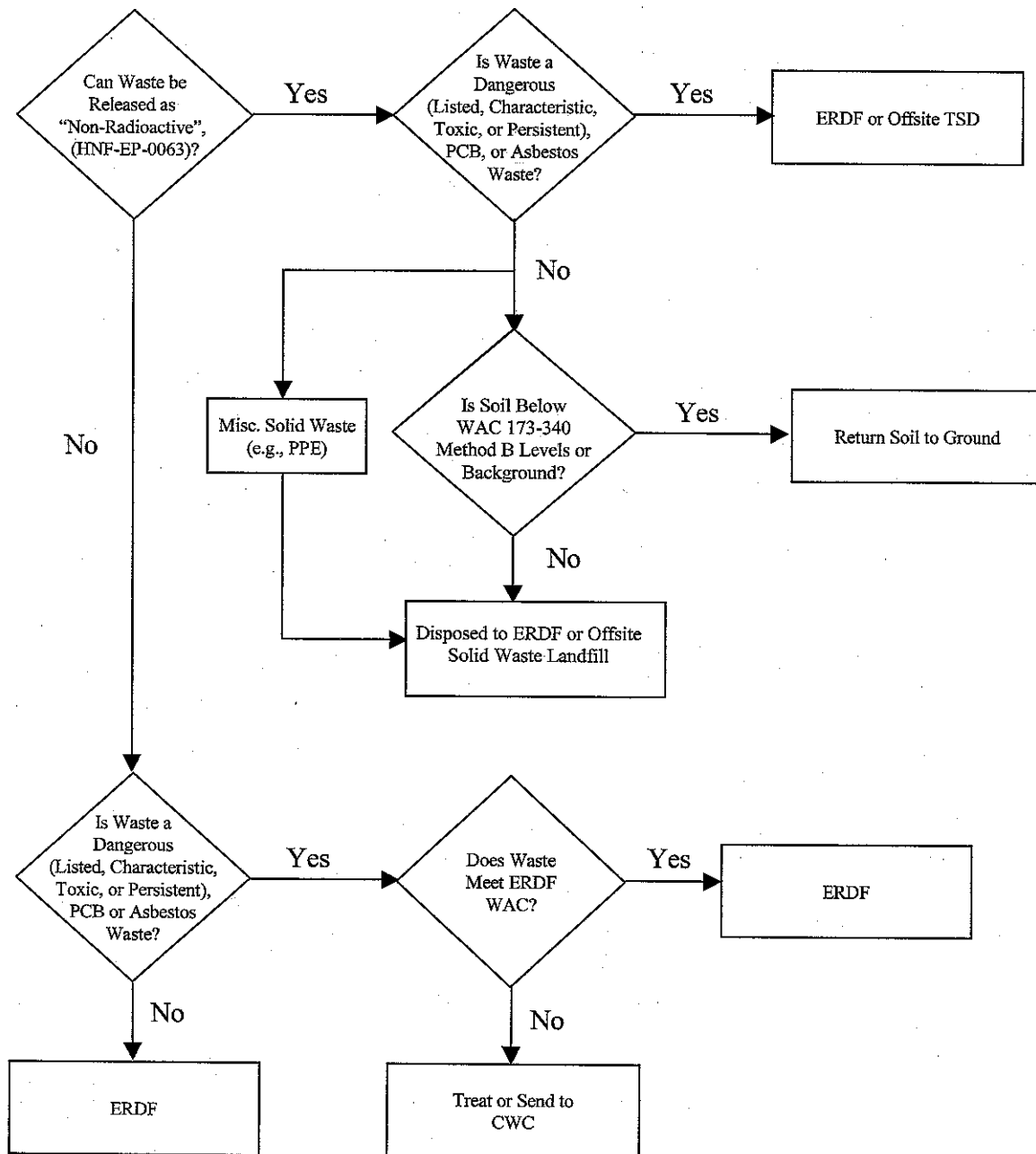
The vadose zone extends from the ground surface down to approximately 23.5 m (77 ft) for the proposed sites (based on the highest recorded groundwater levels, see Table 1-1). Drill cuttings should be stockpiled on plastic sheeting. These drill cuttings are not expected to be chemically or radiologically contaminated, but should be scanned periodically with hand-held radiological field-screening instruments (e.g., Eberline E-600 with SHP 380 AB probe¹). If no field-screening readings are above background, drill cuttings should be returned to the ground surface in the immediate vicinity of the well; otherwise, the drill cuttings should be sampled from the interval showing the highest readings from the field-screening instruments. If sampling is required, then the Environmental Compliance Officer, project task lead, and Radiological Control lead will determine the analyses to be completed.

5.1.2 Saturated Drill Cuttings

All drill cuttings from below the highest recorded water table, as stated in Section 5.1.1, shall be containerized. These drill cuttings were determined not to be chemically and radiologically contaminated, however, should be scanned periodically using hand-held radiological field-screening instruments (e.g., Eberline E-600 with SHP 380 AB probe). The waste will be dispositioned in accordance with the disposition of soils analyzed during the 100-HR-3 OU campaign (e.g., return to the environment), unless field screening or visual observations indicate contamination. If contamination is determined to be present, then a soil sample shall be collected from 1.5 m (5 ft) below the groundwater table, or at the highest reading from field-screening instruments, and analyzed for the constituents on the COPC list. Figure 5-1 provides the decision on how saturated drill cuttings are dispositioned.

¹Eberline E-600 and SHP 380 AB are trademarks of Thermo Eberline, Santa Fe, New Mexico.

Figure 5-1. Soil Cuttings Waste Disposition Flowchart.



HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*.

WAC 173-340, "Model Toxics Control Act - Cleanup," *Washington Administrative Code*, as amended.

CWC = Central Waste Complex.

ERDF = Environmental Restoration Disposal Facility.

PCB = polychlorinated biphenyl.

PPE = personal protective equipment.

TSD = treatment, storage, and disposal.

WAC = waste acceptance criteria.

5.1.3 Personal Protective Equipment and Small-Volume Miscellaneous Waste

The PPE and small-volume miscellaneous solid waste (e.g., gloves, wipes) from vadose zone drilling should be separated from the other waste resulting from saturated zone drilling and sampling. The PPE and small-volume miscellaneous solid waste from vadose zone drilling should be treated as nonhazardous/nonradiological waste unless field-screening measurements show elevated readings. Likewise, the PPE and small-volume miscellaneous waste (e.g., packaging materials, gloves) generated during drilling in the saturated zone should be treated as nonhazardous/nonradiological waste unless field-screening measurements show elevated readings.

Purgewater shall be designated based on process knowledge (Table 1-1) and shall be collected and contained at the well head or at the designated central storage area for this project until it is transported to the Purgewater Storage and Treatment Facility or to the Effluent Treatment Facility. Purgewater will not carry listed waste code.

This page intentionally left blank.

6.0 REFERENCES

- 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Title 40, *Code of Federal Regulations*, Part 300, as amended.
- 40 CFR 268.40, "Land Disposal Restrictions," "Applicability of Treatment Standards," Title 40, *Code of Federal Regulations*, Part 268.40, as amended.
- 90-ERB-040, 1990, "Strategy for Handling and Disposing of Purgewater at the Hanford Site, Washington," (letter to P. T. Day, U.S. Environmental Protection Agency, and T. L. Nord, Washington State Department of Ecology, from R. D. Izatt), U.S. Department of Energy, Richland Operations Office, Richland, Washington, July 19.
- Asbestos Hazard Emergency Response Act of 1986*, 15 USC 2641, et seq.
- BHI-00917, 1996, *Conceptual Site Models for Groundwater Contamination at 100-BC-5, 100-KR-4, 100-HR-3, and 100-FR-3 Operable Units*, Bechtel Hanford, Inc., Richland, Washington.
- BHI-01119, 2001, *Hanford Site Atlas*, Rev. 2, Bechtel Hanford, Inc., Richland, Washington.
- CCN 0542880, 2002, "Waste Designation: Hanford Site Groundwater Contacted Wastes," (letter to G. G. Hopkins from J. V. Borghese), Bechtel Hanford, Inc., Richland, Washington, February 21.
- CCN 081034, 2000, "Application of Listed Waste Codes to Secondary Solid Wastes Related to Well Construction, Maintenance, and Sampling," (interoffice memorandum to distribution from J. V. Borghese), Bechtel Hanford, Inc., Richland, Washington, August 1.
- Comprehensive Environmental Response, Compensation and Liability Act of 1980*, 42 USC 9601, et seq.
- DOE/RL-93-43, 1994, *Limited Field Investigation Report for the 100-HR-3 Operable Unit*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-97-01, 2000, *Interim Action Waste Management Plan for the 100-HR-3 and 100-KR-4 Operable Units*, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- Ecology 94-115, 1994, *Natural Background Soil Metals Concentrations in Washington State*, Toxics Cleanup Program, Washington State Department of Ecology, Olympia, Washington.
- Ecology 94-145, 2001, *Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation; CLARC, Version 3.1*, Washington State Department of Ecology, Olympia, Washington.

- EPA/541/R-99/039, 1999, *Declaration of the Record of Decision for the 100-BC-1, 100-DR-1 and 100-HR-1 Operable Units*, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA/ROD/R10-00/121, 2000, *Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Units*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.
- EPA/ROD/R10-96/134, 1996, *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.
- Fetter, Charles W., 1998, *Contaminant Hydrogeology*, 2nd ed., Prentice hall, Upper Saddle River, New Jersey.
- H-1-4046, *100D and DR Areas Process Waste System*, Hanford Site Drawing.
- H-1-9603-DR, *100-DR Water Plant General Site Plan*, Hanford Site Drawing.
- HNF-EP-0063, 2003, *Hanford Site Solid Waste Acceptance Criteria*, Rev. 9, Fluor Hanford, Inc., Richland, Washington.
- M-1901-D Sheet 5, *Lines & Underground Water at 100-D Area*, Hanford Site Drawing.
- M-1904-D Sheet 5, *Outside Lines - Sewer at 100-D*, Hanford Site Drawing.
- PNNL-13895, 2002, *Hanford Contaminant Distribution Coefficient Database and Users Guide*, Pacific Northwest National Laboratory, Richland, Washington.
- Toxic Substances Control Act of 1976*, 15 USC 2601, et seq.
- Virtual Library*, Hanford Site database.
- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended, Washington State Department of Ecology, Olympia, Washington.
- WAC 173-340, "Model Toxics Control Act - Cleanup," *Washington Administrative Code*, as amended, Washington State Department of Ecology, Olympia, Washington.
- WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards," *Washington Administrative Code*, as amended, Washington State Department of Ecology, Olympia, Washington.
- WAC 173-340-747, "Deriving Soil Concentrations for Ground Water Protection," *Washington Administrative Code*, as amended, Washington State Department of Ecology, Olympia, Washington.
- WHC-SD-EN-TI-181, 1993, *100-D Area Technical Baseline Report*, Westinghouse Hanford, Company, Richland, Washington.

WMP-18442, 2003, *Data Quality Objectives Summary Report for Waste Disposition of Fiscal Year 2004 100-HR-3 Monitoring Wells*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

This page intentionally left blank.

DISTRIBUTIONOnsite

1	<u>Bechtel Hanford, Inc.</u>	
	G. G. Hopkins	H9-03
1	<u>Duratek Federal Services of Hanford, Inc.</u>	
	J. A. Winterhalder	E6-35
1	<u>Fluor Federal Services</u>	
	J. H. Bashore	S0-01
11	<u>Fluor Hanford, Inc.</u>	
	J. B. Bolles	T4-09
	J. V. Borghese	E6-35
	R. J. Fabre	S0-01
	G. B. Gould	S0-01
	T. M. Hottell	S0-01
	S. D. Landsman	S0-01
	E. C. Rafuse	S0-01
	L. R. Strickling	T4-05
	G. S. Thomas	E6-35
	L. D. Walker	E6-35
	C. S. Wright	E6-35
1	<u>U.S. Department of Energy, Richland Operations Office</u>	
	DOE Public Reading Room	H2-53
1	<u>Pacific Northwest National Laboratory</u>	
	Hanford Technical Library	P8-55
2	<u>Lockheed Martin Information Technology</u>	
	Central Files	B1-07
	Document Processing Center	A3-94

This page intentionally left blank.